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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 138

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GEOLOGIST: USSR MAY STOP ACCEPTING FINLAND'S SPENT FUEL

Helsinki HELSINGIN SANOMAT in Finnish 28 Feb 82 p 8

[Article: "Swedish Geologist Warns: Burial of Spent Nuclear Fuel in Base Rock is Dangerous"]

[Text] Since spent fuel from nuclear generating plants cannot be safely disposed of in base rock, basic corollary studies also ought to be conducted in Finland, rather than relying on the Swedish KBS (Karnbranslesakerhet) study which has proved to be deficient, according to Swedish geologist Nils-Axel Morner.

Morner, who works at Stockholm University, participated on 27 February in a nuclear waste seminar in Helsinki organized by the Suomen Luonnonsuojeluliitto (SLL) [Finland's Nature Protection League] and the Energiapoliittinen Yhdistys (EVY) [Energy Policy Association].

Morner says that the KBS study that was conducted in Sweden during 1977-78 concerning the burying of nuclear fuel wastes in base rock has been adopted in Finland, as in Sweden, as a basis for the resolving of the waste problem, although international studies have confirmed the criticisms brought forth by Morner and other experts.

"It is an outright criminal act to ignore criticism based on scientific fact. The KBS study is in fact a disheartening example of scientific corruption," is the way in which Morner criticizes the way in which that study was approved at the time in Sweden.

The Conditional Law Nullified

Morner therefore considers the adopting of the KBS study as the basic premise for the disposal of nuclear waste to be a nullification of the so-called conditional law which regulates the use of nuclear energy in Sweden, and which prescribes the observance of a completely safe technology for the final disposition of nuclear wastes.

Morner also criticizes the scientific techniques of the KBS report on grounds that only a 20-year span was used in the investigation of the movements of the earth's crust as a basis for the drawing of conclusions on a scale encompassing a million years. Also, borings were made to a depth of only 500 meters in that study to locate a suitable site for the disposition of the wastes.

He tells of base rock drillings conducted by the Soviets in the Kola Peninsula in which rock fissures with running water were noted extending to a depth of more than 10 kilometers. The base rock in Sweden and Finland is known to be in motion and to contain fissures.

Morner warns that the handling of atomic wastes that remain partially radioactive for tens of thousands of years involves unfathomable risks when caution in anticipation of the worst possible contingency must be the operating standard, and not the regard for the economic interests of the power firms as now is the case.

Fanatic Optimism

The handling of the nuclear power issues has been characterized throughout by optimism. When the Imatran Voima power firm first began generating electrical power by means of nuclear energy in Finland, the waste problem was not recognized at all, according to physics lecturer Pekka Suominen from Jyvaskyla.

He said that appearance of retractions of earlier points of view are becoming more frequent even in the publications of IAEA, the international nuclear energy organization. Present admissions include the one that recycling though a breeder reactor, some of which are under construction in France, West Germany, and the Soviet Union, is not economically productive due to the hazardous nature of that process.

Planning director Hannu Penttila of the SLL criticized the plan for a projected nuclear energy generating plant currently in preparation in the Ministry of Trade and Industry, and the recently published second partial report dealing with waste disposal prepared by the nuclear energy legislation committee.

The SLL feels that the nuclear waste cost disposal computations contain some factors that create uncertainty.

Uncertain Computations

"Experience has shown that computations about various forms of energy production can be invalid. The public at large is constantly being confused by conflicting reports about the advantage of either coal or nuclear energy. That is why computations concerning the economics of a proposition are not worth considering as the basis for decisions."

The SLL recommends instead that such factors as environmental protection, employment, and other social policy considerations be used as a basis for the making of far-reaching decisions. The SLL suspects that the cost figures for nuclear waste disposal are underrated in the report.

A statement in the second partial report prepared by the nuclear energy legislation committee of the EVY demands that the nuclear energy law currently being drafted ought to prohibit the production of nuclear wastes until such time as adequate assurance is available concerning the safety of nuclear waste disposal.

"The draft law completely avoids stating whether there generally exists any scientific and technological measures at all for the safe storage of nuclear waste. They do not exist anywhere. As matters now stand, the collecting of nuclear waste fees grants license for the production of those wastes," says researcher Raimo Lilja.

Soviet Union's Responsibility for Waste Handling

Lilja feels that Finland ought to receive assurance that the Soviet Union will continue in the future to take care of the spent nuclear fuel from the generating plants in Loviisa. Lilja demands that the agreement between the Finnish Imatran Voima firm and the Soviet enterprise be made public so that waste disposal can be brought under control at least to that degree.

"The shortcomings in the nuclear energy program of the Soviet Union and the obvious advances elsewhere in the world provide reason to wonder whether the Soviet Union will lose interest before long in handling Finnish nuclear wastes gratis," warns Lilja.

He points out also that even now no provision exists for coping with wastes that may be created by a nuclear accident. The nuclear power enterprisers ought, in the manner of the oil accident fund, to pay a fee into a nuclear accident reserve fund in the Bank of Finland, in addition to the waste disposal feel, because insurance coverages do not provide compensation for damage to the environment by a nuclear accident.

According to Lilja, the present directional trend ties the nuclear fuel situation to temporary reserves for a period longer than planned, because the developing of final long-term storage has not been possible, which in turn leads to every greater danger in respect to the decreasing temporary supply. These he feels, can, develop into greater sources of danger than even the generating plants themselves.

5955
CSO: 5100/2107

WASHINGTON CORRESPONDENT ON MALONE REASSIGNMENT

Madras THE HINDU in English 11 Mar 82 p 8

[Article by N. Ram]

[Text] THE exit of Mr. James Malone as the Reagan Administration's ranking operative on "non-proliferation" and international peaceful nuclear cooperation matters has been confirmed by the State Department.

Although its spokesman denied that the Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs was being forced out because of a feeling among top Administration officials that Mr. Malone had demonstrated inability or incompetence in working out a politically saleable policy for increased U.S. nuclear exports, the media here have generally not bought this explanation.

From the time of his nomination by Mr. Ronald Reagan in early 1981, Mr. Malone has had serious problems with Congress. His confirmation hearings in the Senate Foreign Relations Committee ran into rough weather, when Senator John Glenn and others sharply challenged his credentials and suitability in a sensitive job. In particular, they raised conflict of interest objections in view of the fact that he had been a legal broker for power companies in Taiwan and Japan, but had not removed himself properly from a role in shaping the Reagan Administration policy — as co-author of transition team recommendations on the subject (for a detailed summary of this unreleased document, refer to THE HINDU of April 15, 1981).

Confused position

The Congressional strikes against Mr. Malone as the State Department's senior operative on non-proliferation affairs are many, making for a very confused position. Senior Reaganite officials in the executive branch and the minority of members of Congress who believe the U.S. has gone too far in its rigid 'non-proliferation' policy fault Mr. Malone for not doing enough to reverse the Carter Administration directions and enhance the competitiveness of U.S. nuclear exports.

Those like Mr. Glenn, who can carry a clear majority probably in the Senate and certainly in the House with them, blame Mr. Malone for diluting non-proliferation concerns, as can be seen in "supply side" moves in nuclear policy favouring Japan, Brazil, Australia, Mexico, and even the apartheid regime of South Africa. This is on top of their faulting the Reagan Administration for forcing an exemption for the Pakistani regime from the Symington Amendment.

So far as India is concerned, those specialising in nuclear 'non-proliferation' affairs in Congress see the deadlocked Tarapur talks as further evidence of the Administration's inability to pursue non-proliferation interests consistently or in a coherent, businesslike manner. Well-placed congressional sources told THE HINDU that under Mr. Malone's direction, the precise details of the positions in the Indo-U.S. talks were kept away even from specialist Congressmen, with the result that Indian newspapers had to be gone through to glean the details of what happened.

For example, the non-proliferation warriors in the U.S. Congress did not know (and were not amused to learn) that in the Tarapur talks Mr. Malone had breezily announced to the Indian negotiators that the Reagan Administration had decided "not to press approval rights for reprocessing of the spent fuel." They have also frowned upon (after discovering the "informal" and secret twist in the columns of Indian newspapers) the suggestion that the U.S. might be able to help find a new external source of fuel for Tarapur within the control framework of the 1963 agreement — comparable, although only in a limited way, to the decision to permit Brazil "to obtain elsewhere the single fuel load now needed for Angra I" (Brazil's first power reactor, constructed under contract with Westinghouse) without making it an issue or invoking the penal clauses of the 1972 bilateral agreement for peaceful nuclear cooperation.

Leak of memorandum

The leak of an internal State Department memorandum authored by Mr. Malone (dated October 2, 1981) reviewing the policy changes proposed in the non-proliferation law — to transfer all NRC licensing functions to the State Department (one of the chief recommendations in the transition team report), repeal legislation barring U.S. nuclear exports as well as military and economic aid to countries found to be moving towards the production of nuclear weapons, relaxing current requirements in the U.S. nuclear export law concerning "fullscope safeguards" — fuelled the anger of the Congressional critics.

The Administration quickly retreated from the positions laid out in the memorandum, but the content of the secret document raised Congressional suspicions of Mr. Malone to new levels. In November, Mr. Glenn angrily targeted the October memorandum for giving "a new lease" to the hopes of resisters that "if they hold out a little longer, they will be able to renew trade with the U.S. without submitting to IAEA safeguards across the board." The leading Congressional expert on non-proliferation also expressed concern over the tendency to approve "pell-mell" every request from Japan, Sweden, Spain and Switzerland concerning reprocessing.

With unconscious irony (since at that time he clearly did not know of the concession on reprocessing seven months earlier in the Tarapur negotiations), Mr. Glenn asked rhetorically: "How can we discourage the export of this technology to sensitive regions, or persuade countries like India to forego reprocessing when, with every ounce of strength, it seems, we are telling the world that reprocessing makes sense and is a legitimate part of a civilian nuclear programme?"

Mr. Malone dealt-as it has turned out, perhaps one last time-with the major issues in an address submitted to a conference in San Francisco in early December: 'I want to lay to rest one possible misperception, entertained in some quarters, of the bottom line on U.S. non-proliferation policy. It is, of course, true that we intend to enhance the international competitiveness of U.S. nuclear exports by all appropriate means...It is also true that, in contrast to the uniform approach that held sway previously, our approach will be a more differentiated one...(But) it is most definitely not true...that the Reagan Administration is less concerned than its predecessors about the threat of nuclear proliferation...'

He added: 'In our bilateral discussions on matters of nuclear commerce and non-proliferation...it has been clear to our counterparts from other countries that the Reagan Administration's orientation on this critical issue extends forward the straight line of American policy concern that goes back to the beginning of the atomic age'.

He made one other interesting point. 'In contrast to the uniform approach that held sway previously, our approach will be a more differentiated one...Over the years there arose a tendency in U.S. non-proliferation and nuclear export policy to seek to treat all customers alike and to expect that the inflexible and non-discriminatory rule of law that guides our affairs at home could somehow be universally applied to regulate our decisions on nuclear exports. Of course, in the real world, it turns out that potential customers for our nuclear exports are characterised by an extreme disparity in their non-proliferation merit and run the gamut from those countries whose sense of responsibility on this issue is no less than our own to those with whom we could not consider nuclear cooperation at all.'

Mr. Malone went on, in this address, to review several 'country-related issues'-taking in Japan, Switzerland, Mexico, Brazil, Egypt, South Africa and Pakistan-but carefully left Tarapur out of his public discussion.

The only reference to India in the policy address came at the tail-end, in the following context giving it negative credit: 'In the wake of India's 1974 detonation it was understandable that the U.S. was impelled to impose strict controls on exports of sensitive nuclear materials, equipment, and technology. But...we went too far when these restrictions extended to our closest allies and industrial partners and, as a result, we began slipping in terms of our nuclear industry's ability to compete at the industrial level. This is now being changed. What has not changed is our commitment to a strict nuclear export policy when it comes to countries in unstable areas that are real proliferation risks'.

New job for Malone

The State Department spokesman has explained that Mr. Malone is being relieved of his non-proliferation responsibilities in order to allow him to concentrate on his new job as ambassador-at-large in charge of the U.S. team at the law of the seas negotiation. (Mr. Malone has been wearing two hats for some time, but the law of the sea hat in an *ad hoc* capacity. His nomination as ambassador-at-large will come up for confirmation hearings).

State Department sources say that Mr. Richard Kennedy, the former NRC commissioner who is now Under-secretary of State for Management as well as ambassadorial representative to the International Atomic Energy Agency, was given oversight responsibility for Mr. Malone's bureau several months ago. Normally, this 'seventh floor principal's' job would have gone to Mr. James Buckley, as Under-secretary of State for Security Assistance, Science and Technology, but in view of

Mr. Kennedy's interests and experience in the NRC, the oversight was quietly given to him.

With Mr. Malone's eclipse, he has apparently taken 'de facto control' of the section in the State Department which is handling non-proliferation and bilateral nuclear cooperation affairs. Mr. Kennedy, who served in the U.S. army for some 30 years, has a Harvard Business School and national security background, rather than that of a specialist in the nuclear cooperation and non-proliferation field. He has served in the Pentagon, on the National Security Council staff and in the Nuclear Regulatory Commission, where he was a commissioner between 1975 and 1980. He formally assumed his senior State Department responsibilities a week after Mr. Reagan was sworn into office.

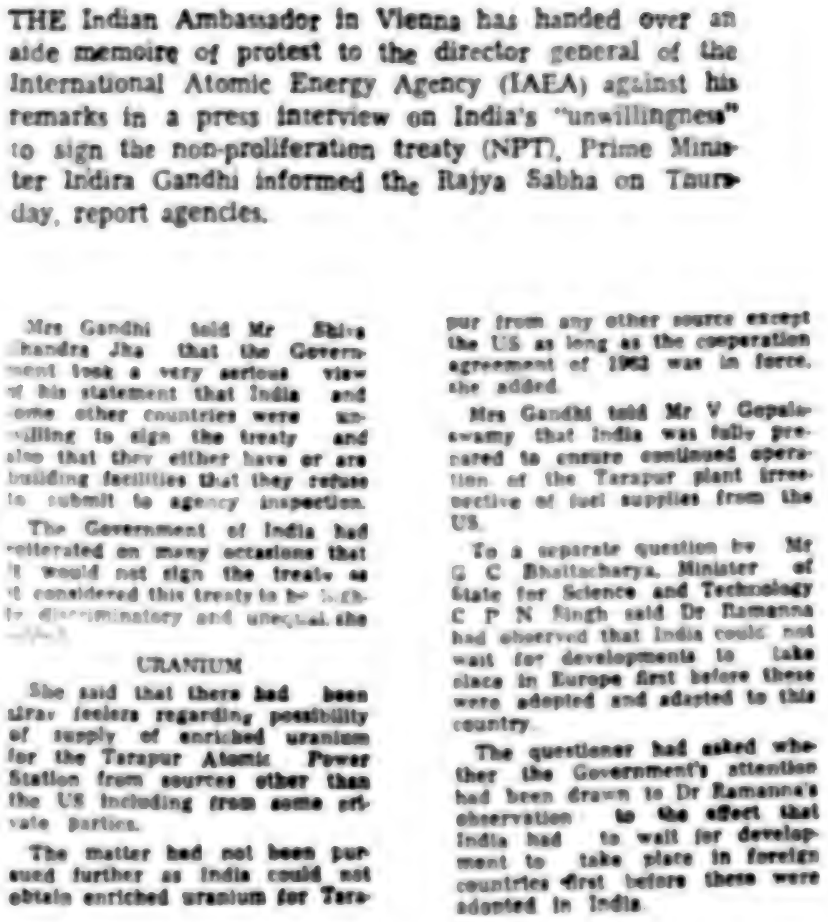
As was pointed out in an earlier report in THE HINDU, Mr. Kennedy is quite familiar with the Tarapur relationship, but his stance so far as India is concerned has been regarded as uncertain, wavering and dubious. Meanwhile, the search for a successor to Mr. Malone, the nuclear broker is on. The need to deal with a new man at a late stage in the painful bargaining on a framework to formalise the termination of the U.S. nuclear supply relationship with India will probably mean some more delay. It will perhaps add an element of complication. This is more so because Mr. Malone, as readers of these columns will recall, preferred to negotiate in a relatively closed environment and showed a penchant for 'private or personal dealings,' notably with the External Affairs Ministry official, Mr. Eric Gonsalves.

CSO: 5100/7062

GANDHI TALKS TO RAJYA SABHA ON NUCLEAR POLICY

New Delhi PATRIOT in English 19 Mar 82 p 5

[Text]



THE Indian Ambassador in Vienna has handed over an aide memoire of protest to the director general of the International Atomic Energy Agency (IAEA) against his remarks in a press interview on India's "unwillingness" to sign the non-proliferation treaty (NPT), Prime Minister Indira Gandhi informed the Rajya Sabha on Thursday, report agencies.

Mrs Gandhi told Mr Shiva Chandra Jha that the Government took a very serious view of his statement that India and some other countries were unwilling to sign the treaty and also that they either have or are building facilities that they refuse to submit to agency inspection.

The Government of India had reiterated on many occasions that it would not sign the treaty as it considered this treaty to be highly discriminatory and unequal, she added.

URANIUM

She said that there had been stray feelers regarding possibility of supply of enriched uranium for the Tarapur Atomic Power Station from sources other than the US including from some private parties.

The matter had not been pursued further as India could not obtain enriched uranium for Tarapur from any other source except the US as long as the cooperation agreement of 1963 was in force, she added.

Mrs Gandhi told Mr V Gopalaswamy that India was fully prepared to ensure continued operation of the Tarapur plant irrespective of fuel supplies from the US.

To a separate question by Mr G C Bhattacharya, Minister of State for Science and Technology C P N Singh said Dr Ramanna had observed that India could not wait for developments to take place in Europe first before these were adopted and adapted to this country.

The questioner had asked whether the Government's attention had been drawn to Dr Ramanna's observation to the effect that India had to wait for development to take place in foreign countries first before these were adopted in India.

CSO: 5100/7067

JANATA LEADER FOR INDIAN NUCLEAR CAPABILITY

New Delhi PATRIOT in English 14 Mar 82 p 7

[Text]

Janata Party leader Krishan Kant on Saturday argued for acquiring nuclear capability for India in view of Pakistan's emphasis in having their bomb and the gradual nuclear encirclement of India.

In a statement, Mr Kant said the country could not be lulled into a false sense of security, as had been sought to be done by the Government when it showed the video film which claims that Pakistan is only two-fifths on its way to the nuclear path. The implication made [illegible] the Government, he said, [illegible] that India was far ahead.

The Janata leader argued that a trap lies in these types of calculations as Pakistan does not really have to wait any length of time once that country gets the vital five per cent technology of reprocessing that had been withheld by France. In fact, Mr Kant said, though Pakistan had complained that this had been withheld, the French manufacturers contradicted President Zia-ul-Haq's statement and implied that full technology had been transferred.

The history of nuclear development in Asia was a warning to India, Mr Kant said. China had started behind India, but had soon surpassed it and now is a decade ahead in missile and weapons technology. Pakistan too started late, but has almost caught up. The 95 per cent uranium enrichment being done in Pakistan is not for power production, nor reprocessing of plutonium for fast breeders because such a programme does not exist in Pakistan. The inference is that they have a war-like use.

India, Mr Krishan Kant said risks the danger of lagging behind.

"Parliament must not allow the Government to camouflage India's nuclear weakness," the Janata leader said. "The no-war offer of Pakistan or friendly gestures of China should not cloud our vision." The arms race had been thrust on India. India could make it less costly and less-dependent on others by choosing the nuclear option, he added.

CSO: 5100/7066

LACK OF SPARE PARTS RENDERS TARAPUR UNSAFE

Bombay THE TIMES OF INDIA in English 14 Mar 82 pp 1, 9

[Article by J.N. Parimoo]

[Text] Washington, March 13--Spare parts essential to the safety of the Tarapur plant and urgently needed for its continued operation are being denied by the Reagan administration mainly for political reasons.

For nearly a year and a half, the U.S. state department and the Nuclear Regulatory Commission have been sitting on the application for a licence to allow export of the much-needed spare parts.

Persistent SOS requires of the Indian atomic energy department have fallen here on deaf ears evidently because some elements in the U.S. administration see in India's desperate need their opportunity for political arms twisting.

The nuclear power division of General Electric, the American company that built the reactors at Tarapur, has warned the state department in a letter dated November 20, 1981 that any mishap at Tarapur would be attributed to India's inability to get the American components.

Among other things the letter says: "As you know, we are troubled by the spectre of a malfunction at Tarapur which could be attributed to India's inability to obtain the needed components from General Electric and several other export licence applicants.

"Since our application is now past a year old, we urge at least a fresh review to determine whether there is some undiscovered avenue under the constraints of legislation for treating reactor component applications on a different basis than for the export of fuel for Tarapur."

The spare-parts sought by the Tarapur atomic power plant are: source range monitors and intermediate range monitors (SRMs and IRMs). These instruments are essential to the effective monitoring of the safe working of the inner core of the reactors which are otherwise inaccessible.

An American expert of the U.S. Nuclear Regulatory Commission told me today that in the United States any atomic power plant running short of such instruments or utilising old and overused monitors (as Tarapur seems to be doing currently) could be ordered to be shut down immediately.

"That is standard regulation because you cannot run the reactor if you are not sure of what is happening in the hard core. Your plant sure needs these instruments badly."

"Then why don't you send them," I asked.

"Oh boy, that is politics. This world is full of politics," he replied.

Opinion in the state department, energy department and the Nuclear Regulatory Commission is divided on the Indian application for spare-parts which was sent to the commission on November 14, 1980.

There are those who, taking a strictly legalistic view, believe that the Indian application fulfils all the three conditions necessary for issuing a licence for the export of components.

Three Conditions

The three standard conditions are IAEA safeguards should apply to the components proposed to be exported under the licence; the components proposed to be exported to India would not be used for the development of a nuclear device or for the purpose of any research for a nuclear explosive device, and the importing country will not retransfer the components to any other country.

The Tarapur plant is working already under the safeguards of the International Atomic Energy Agency (IAEA) and all the necessary assurances in this regard have already been given by the government of India.

These generic assurances were given by the government of India as early as March 1979.

From a strictly legal point of view the Nuclear Regulatory Commission should have issued the licence long ago. But there is another more influential point of view. It is more political than legal.

According to this section of opinion, Mrs Indira Gandhi's government should be pinned down to some additional assurances to safeguard--the so-called nuclear non-proliferation interests of the U.S. administration.

For the past several months the state department has mounted pressures on Delhi to secure such assurances. There are unconfirmed reports that the government of India in its desperation has already given some such assurances to signify that it has no plans in the foreseeable future to explode a nuclear device.

Even in spite of the additional assurance reportedly conveyed by India's foreign secretary Mr Eric Gonsalves to the U.S. assistant secretary of state, Mr Malone, the anti-India lobby in the Nuclear Regulatory Commission and in the state department remains unconvinced.

If the commission is pressed to take a decision on the Indian licence it may turn down the application or there may be a tie of vote in the four-member commission.

Should this happen, the matter would have to go back to the Reagan administration and may be ultimately to Congress.

In the meantime, the Tarapur plant has entered a stage of operation which experts here consider unsafe. In a letter dated November 14, 1980, the General Electric Company had told the U.S. administration that "in the light of the safety importance of these parts and their unquestionable insignificance from a proliferation standpoint, it would be most unfortunate as well as unreasonable if this export licence application were considered by the NRC or the executive branch in conjunction with the pending application for the export of fuel...."

Emphasising the importance of the spare-parts from the safety angle, a letter from the Indian atomic energy department addressed to the General Electric Company which is dated October 22, 1981 says: "The SRM detector and monitors are part of reactor safety system."

"At no time can the core be left without monitoring. The SRM detector and monitors should be on line all the time even during unit outage and when the reactors are in cold shutdown condition to ensure safety."

CSO: 5100/7065

POSSIBILITY OF COMPROMISE ON TARAPUR FUEL SEEN

Madras THE HINDU in English 9 Mar 82 p 8

[Article by N. Ram]

[Text] AFTER holding firm through three rounds of talks spread over seven months, New Delhi appears to be engaged in an exercise that amounts to backing off an uncompromising line on the Indo-U.S. nuclear relationship. It has found vacillations and the tendency to make concessions on the basic issues creeping into the phase of decisive political action.

The inconclusiveness of the recent deliberations of the parliamentary consultative committee, on the one hand, and the stretched out consultations between the two Governments, on the other, do appear, from Washington, to reflect the compromising tendency. If the outcome is a new external reliance for Tarapur fuel with attendant IAEA safeguards — brokered by the U.S. within the control framework of the 1963 agreement — it would unquestionably represent a retreat from the positions spelt out in the three rounds of talks in 1981.

The information available to THE HINDU in Washington seems to permit no other construction on the evolving situation.

Towards the end of 1981, India signalled the U.S. of an impending announcement in Parliament that, in view of the persistent non-performance and the unilateral decision by the U.S. to terminate its nuclear fuel supply relationship, the 1963 nuclear cooperation agreement with all its obligations and rights was "null and void". The decisive and, in a sense, irreversible step could have been taken only at the highest political level, but it has not materialised.

The compromise

The compromise under question concerns the very issues, the central and linked ones, on which the talks broke down: (a) The continuation of IAEA safeguards on the Tarapur reactors and spent fuel and (b) an external source of fuel supply to facilitate (a). The shape of the compromise could deflect India from the earlier Cabinet-level decision to take the mixed oxide fuel (MOX) route for Tarapur — or at least postpone its operation.

The problem flows from the insistence by the U.S., from mid-1981, that a new source of external fuel supply must simply be accepted, if only as a means of keeping IAEA safeguards in place (since there was no possibility of India accepting safeguards at Tarapur in the absence of an external supply of fuel).

Mr. James Malone, the leader of the U.S. delegation, was far from subtle on the point. He announced that the U.S. would be "flexible" in its approach and accept a "low-key" role in the new arrangement, but India's removal of IAEA safeguards at Tarapur "would have a considerable adverse impact on bilateral relations.... There was no doubt that the reaction in Congress would be sharp.... It would be better if India could give more consideration to this (the implications for Indo-U.S. relations) before coming to final conclusions".

At least New Delhi appears to have interpreted this as some kind of threat.

However, the Indian delegation held firm through the July and November rounds of talks. As Dr. H. N. Sethna, leader of the delegation, put it in the New Delhi round in July 1981: "Under Article VI of the 1963 agreement, it is clearly mentioned that India accepts safeguards only because it is limiting its resources of fuel to U.S. supplies of enriched uranium.... The safeguards are the result of the supplies of U.S. fuel.... The question of a new source of fuel for Tarapur does not arise at the moment, as we intend to run the plant with mixed oxide fuel utilising plutonium obtained from the reprocessing of the spent fuel".

Mr. Eric Gonsalves, Secretary in the External Affairs Ministry, addressed the political side of the problem on the same occasion: "We have the right to abrogate the agreement unilaterally on grounds of material breach.... There is a limit to which we can go being accommodating. Apart from pressing technical reasons, we are also answerable to our public opinion. We have exercised restraint precisely for the benefit of our relations with the U.S. If Congress chooses not to understand, it is incumbent both on the administration and on us to explain why the safeguards have been removed.... We hope the administration will play fair and use its powers to convince Congress rather than using (it) as a lever against us".

Further, he reported, "At our parliamentary consultative committee meeting there was unanimity on the point that we would not accept continuing obligations under the termination of the 1963 agreement. If India were to go in for a new source of supply, safeguards could have been considered. This is ruled out since the supplies are to be indigenous".

These positions were reiterated in the third round of talks in Washington in November 1981.

Unorthodox proposal

However, the U.S. side came up with a new twist on the eve of this round. Mr. Malone, the former nuclear broker, played (outside the official talks, and privately to Mr. Gonsalves) upon the possibility that the U.S. might be able to get someone within the European suppliers' group to send fresh fuel for Tarapur within the control framework of the 1963 agreement. Although there were earlier recommendations from Mr. Malone that India consider the Soviet Union as an alternative supplier, the supplier really favoured by Washington seemed to be France (see report in THE HINDU of November 27).

Towards the end of 1981, given the positions developed over the protracted negotiations, the possibility of pursuing this twist, or unorthodox proposal, seemed remote. American officials seemed to be expecting a "unilateral" declaration on Tarapur in the winter session of Parliament, and were certainly talking about it privately.

The statement by the Prime Minister, Mrs. Indira Gandhi, before the parliamentary consultative committee in December 1981 seems to have altered the official posture on Tarapur substantively, by setting forth two essential conditions for an approach to resolving the problem of Tarapur.

First, the decision on the 1963 agreement would have to ensure the continued operation of the power station. Secondly, it would have to be taken within the context of "the national interest and overall bilateral relations with the U.S.". The latter has been read in India, as well as in Washington, as making improbable a "unilateral" declaration of the cessation of the treaty along with its rights and obligations.

The reading has been strengthened by subsequent statements and indications in New Delhi, and also by the recent observation by the U.S. Ambassador to India, Mr. Harry Barnes, to the effect that India and the U.S. are making efforts to "narrow down their differences on the supply of nuclear fuel for Tarapur". Since there seems no question of resuming the American fuel supply, this can only mean that the U.S. is involved in brokering or negotiating in some way a fuel supply relationship for India with another external source.

In sum, the bottom line for the U.S. is the continuation of IAEA safeguards at Tarapur despite the termination of its fuel supply relationship. It has clearly more than one objection to the independent MOX route (including the "plutonium economy" argument), but the main objection is that this renders IAEA safeguards inapplicable.

Technically reliable

On the other side, the Indian nuclear establishment — in contrast to some temporising voices elsewhere in New Delhi, notably from the External Affairs Ministry — has firmly advocated the MOX route as a technically reliable one (that has reportedly absorbed some Rs. 38 crores of investment over time) that frees India's hands from the prevailing non-performance, the potential legal complications, and the vagaries and uncertainties of an external source of fuel supply as well as of the IAEA under the stewardship of Mr. Hans Blix.

In mid-1981, Dr. Sethna offered the American negotiators the estimate that the fuel supplied to Tarapur by the U.S. was sufficient to keep the station working, on the MOX process, until 1989-90 — not significantly short of the cut-off date for the original fuel supply commitment (1993). Subsequently, he expressed to the U.S. negotiators and also publicly a robust confidence in the process.

At the end of the exercise, Dr. Sethna's delegation is known to have recommended that, in the absence of any perceivable common ground for an "orderly" or mutually agreeable termination of the 1963 agreement and in view of the attempt by the U.S. side to stretch out the negotiations indefinitely, there seemed to be no alternative for India but to act decisively to free itself from the albatross of a non-performing agreement.

The background to this bears reiteration in these columns. Despite a "private" and controversial move by Mr. Gonsalves concerning a PNE (peaceful nuclear explosion) (see THE HINDU of February 22, 1982) that had no demonstrable business with Tarapur, India's basic position in the 1981 Tarapur negotiations was defined by the following guideposts.

The preference was for continuing the 1963 agreement, through the U.S. correcting its performance as a supplier under treaty commitment. If this was not possible, the break should be clean and should free both parties from their rights and obligations — or as Dr. Sethna put it in April 1981 (after Mr. Malone delivered his "bombshell" on termination), "nothing survives."

The United States opened the talks with the unilateral intimation that the exercise must pursue "an agreed termination of the nuclear supply relationship". The basis it proposed was (a) termination of the relationship, and (b) "release of both sides from obligations under the existing agreement while seeing that at the same time the rights and obligations attaching to the application of safeguards on the reactors and materials would continue."

Malone's non-paper

More specifically, the "non-paper" Mr. Malone presented to Dr. Sethna on April 16 stated that a mutually agreed termination "should at a minimum accomplish the following": Terminate the agreement for cooperation, provide for the continued application "at all times" of IAEA safeguards on the items covered by the trilateral safeguards agreement, ensure that a continued commitment that such items would be "only for peaceful purposes and not for any nuclear explosive purposes", and offer a continued commitment that such items shall remain in India.

The non-paper provided some alternative formulae or "sample approaches" on how these objectives could be met. Significantly, Mr. Malone held out the promise of not making "joint determination" of reprocessing an issue, provided agreement could be secured on the other points, and promised "flexibility".

India responded with its own "non-paper" on April 17. It mentioned its preference for a continued (and corrected) implementation of the 1963 agreement, but noted that in view of the decision indicated by the U.S. to terminate the fuel supply relationship, the obligations could not survive one-sidedly on "the party that has fully abided by the agreement."

In brief, the U.S. proposal for terminating the agreement "could not be a suitable formula for agreed termination." Subsequently, Mr Malone confirmed that "the U.S. has decided not to press approval for reprocessing of the spent fuel" (despite political problems this was said to pose with the Congress), and promised to be responsive to India's "sensitivities" on Tarapur. He was prepared to accept "a low key and unobtrusive arrangement with (the) IAEA, with no U.S. involvement."

A supplement

He presented a supplement to the original non-paper to the effect that the U.S. was proposing that the items covered by the trilateral safeguards agreement of 1971 (between India, the United States and the IAEA) could be placed under an agreement involving a third country, or an agreement regarding a new source of fuel for Tarapur.

By mid-1981, the pressure clearly shifted to making India accept a new external source of fuel, so that the IAEA safeguards could continue and the MOX route could be avoided. In legal terms, Mr. Malone insisted that safeguards under the 1963 and 1971 agreements were tied to certain "vested rights" and "rights in perpetuity" that the United States had over Tarapur.

But "flexibility" would be manifested in the decision to pursue an "agreed termination" on the basis of a "unilateral" or "voluntary" continuation of IAEA safeguards by India. The leader of the U.S. delegation added that the two other areas of interest to his Government were "subsidiary concerns" which could be taken care of through an official statement in Parliament.

In response to all this, Dr. Sethna developed the position expressed in Article VI of the 1963 agreement, that strongly tied India's acceptance of safeguards to the U.S. supply of fuel. Safeguards resulted solely or exclusively from the supplies of U.S. fuel — in the absence of which the entire agreement would be "void."

The head of the Indian delegation announced bluntly in July: "IAEA safeguards will not be acceptable to us. If there is no supply, there can be no safeguards. In our view, no Government can accept such a condition."

The U.S. effort since then has concentrated on deflecting India from a route for Tarapur that would, by obviating the external dependence for enriched uranium fuel, remove IAEA safeguards. Mr. Malone's proposal, made privately to Mr. Gonsalves on the eve of the third round of talks, played upon the possibility of converting a complicated enough trilateral agreement into an affair involving four unequal parties.

To add to the complications, the U.S. has hinted that it might pursue the line that termination of an agreement by one party must, under the international law governing treaties, be preceded by three months' notice; it has also drawn attention to the risks such an action will face from the U.S. Congress.

Ex-Im Bank credit

The current legislation governing the U.S. Export-Import Bank specifies that if a country that has accepted IAEA safeguards "materially violates, abrogates, or terminates...such safeguards" or if it "materially violates, abrogates, or terminates...any guarantees or other undertaking to the United States" (made in an agreement for civilian nuclear cooperation), Ex-im Bank credits to it shall cease. The guillotine can only be got round through a Presidential waiver on grounds of "national interest".

Apart from this, the question arises in official Indian eyes what might happen on the front of economic assistance, or in the multilateral financial institutions, if a determined oppositional stance were adopted.

The United States has also hinted in the course of this exercise that, aside from bilateral modes of making displeasure known, it can take the dispute over the meaning of the 1971 trilateral safeguards agreement to the IAEA.

As 1981's expectations — first of a "clean and orderly" break in the Indo-U.S. nuclear relationship, then of "unilateral" divorce freeing India's hands from the non-performing relationship — seem to have receded, the uncertainty over, and technical, legal and political questions related to, the future of Tarapur linger.

N. Ram

CSO: 5100/7061

LEAK IN RESEARCH CENTER CYCLOTRON REPAIRED

Calcutta THE STATESMAN in English 13 Mar 81 p 1

[Text]

AS the repair of the leak in the vacuum chamber of the Variable Energy Cyclotron of the Bhabha Atomic Research Centre, Calcutta, has been completed, scientists from national research institutions and universities will resume their scheduled experiments at the Centre next week.

This was stated by Mr A. S. Divatia, Project Director of the Centre, on Friday. He said that an overhaul of the machine was almost due towards the end of last year as it had run for the past seven years. In the meantime, a leak in the vacuum chamber of the cyclotron developed in December. He made it clear that the leak had caused no radiation hazards.

The repairs, he said, had resulted in postponement of the scheduled experiments for about eight weeks; but, a few additional facilities for experiments had been provided in course of the overhauling. The scientists at the Centre he said, had worked almost round the clock during the past two months to make the repair. They used indigenous components for the new equipment installed during this period. They had to evolve new techniques to manoeuvre a steel structure weighing 20 tons.

Mr Divatia was confident that the cyclotron would be of good use for at least another 20 years. About 30 cyclotrons of the same model were giving good performance in laboratories all over the world. This was his comment when his attention was drawn to a report in a section of the Press that the machine had become obsolete. He said that its design was no doubt a bit old, but new equipment now available could be used to make up its deficiency.

He said that a number of research institutes and universities in the country had been making use of the machine since its commissioning. Its construction started in 1970 and had passed through several phases. The experiments carried on at the Centre mainly related to nuclear physics, radio chemistry and preparation of isotopes for medicinal use. Successful experiments had been made to produce Gallium isotopes for treatment of cancer, he added.

CSO: 5100/7064

ATOMIC ENERGY BOARD, PLANT COSTS REPORTED

Bombay THE TIMES OF INDIA in English 1 Mar 82 p 2

[Text]

NEW DELHI, February 27.

AN atomic energy regulatory board is being set up by the government for dealing with the safety issues.

In some other countries, such an agency exists and usually it is not part of the atomic energy department. The board is being set up under the Atomic Energy Act.

Meanwhile, the project cost of the two atomic power plants under construction at Kalpakkam near Madras and Narora in Uttar Pradesh have been revised upwards by Rs. 245 crores.

A provision of Rs. 17.31 crores has been made in the budget for 1982-83 for the fifth atomic power station being set up at Kakrapar, in Gujarat. This provision is mainly for procurement of equipment and for civil electrical and mechanical works.

The present approved cost of both units of the Narora atomic power station has been increased from Rs. 209.89 crores to Rs. 327.40 crores.

The costs of the Madras atomic power station which has two pressurised heavy water reactors with a total capacity of 470 MW of electricity has been revised from Rs. 61.78 crores to Rs. 107.87 crores for the first unit and from Rs. 70.63 crores to Rs. 103.02 crores of the second unit.

The main reasons given for increase in the cost of these projects include increase in the scope of works, escalation in the cost of equipment and services and increase in the establishment of maintenance.

A total of Rs. 24.12 crores has been provided in the budget for all the projects of the Bhabha Atomic Research Centre for research and development.

Among the capital projects for which provision has been made in the budget include research reactor (R-5 project) Plutonium recycling project, plutonium plant expansion and uranium metal plant expansion.

The plutonium recycling plant is being set up at Trombay to assess the potential of the plutonium generated during operations of various natural uranium-fuelled power reactors.

CSO: 5100/7059

LONG TERM NUCLEAR ENERGY PLAN

Islamabad THE MUSLIM in English 15 Mar 82 p 5

[Text]

NEW DELHI. India has drawn up a long-term plan for stepping up nuclear energy in the country. The Atomic Energy Commission (AEC), the policy-making body of the Government of India for development and utilisation of atomic energy, has planned to increase the nuclear power capacity to 10,000 mw by the end of this century, UNI reports.

At present, the capacity of the nuclear power plants in the country is 640 mw.

The present plan envisages installing of 10 units with the capacity of 235 mw each. A decision has also been taken to go in for four units as against the present system of two. Each power station in the country has two functioning units at present.

This switch-over is mainly to reduce the lead-time required in the opening of new sites. It is also expected that the construction period of the units will be reduced.

Reprocessing plants are also on the anvil. A reprocessing plant to handle irradiated fuel from pressurised heavy reactors is planned at Kalpakkam, near Madras in South India. The plant for reprocessing fuel from the fast breeder test reactor would also be located on the same premises.

Nuclear power generation in India was first initiated in 1960 with the commissioning of the Tarapur atomic power station, outside Bombay, with an installed capacity of 420 mw.

It was built on a turnkey type contract with a leading U.S. nuclear power plant supplier. The station has been in operation for 12 years, supplying power to Maharashtra and Gujarat States on the western coast. But the capacity of the station has been reduced to 50 per cent because of the uncertainty in the supply of enriched uranium from the United States.

The Rajasthan atomic power station in the State of Rajasthan has two units with 220 mw output. It was a collaborative venture with Canada which provided the design and equipment for heavy water reactor. Unit one of this station came into commercial production in 1973 and the second unit, synchronised to the grid for the first time in November 1980 was in commercial operation from April 1981.

The Narora atomic power station in the Northern State of Uttar Pradesh, consisting of two units with the capacity of 235 mw each of a modified design, is expected to begin commercial operation by the end of 1984.

India is today among the seven countries and the only developing country in the world which has a complete nuclear fuel cycle capability. India has the know-how and, infrastructure to design, construct and operate the facilities right from the initial stages of mining and refining, fuel fabrication, heavy water production and reactor construction to reprocessing and water disposal.

The Indian atomic programme was launched chiefly to supplement the limited conventional energy resources to meet the long-term electricity needs of the country, to produce nuclear power and to utilise techniques in agriculture, industry, medicine and other areas.—PTI Feature

CSO: 5100/5635

BRIEFS

NO REACTOR DECOMMISSIONING--New Delhi, March 11 (PTI)--No nuclear reactor in India is due for decommissioning in this decade, the Prime Minister, Mrs Indira Gandhi, informed the Raiya Sabha today. She told Mr Ramanand Yadav and Mrs Amarjit Kaur in a written reply that all nuclear plants generally were expected to work for about 30 years after which they may have to be considered for decommissioning. The problems associated with decommissioning were well-known and the details would be worked out when required, she added. [Text] [Bombay THE TIMES OF INDIA in English 12 Mar 82 p 9]

FUSION TECHNOLOGY PROGRESS--New Delhi, March 4--India is not lagging behind Pakistan in atomic fusion technology which is in the research stage even in the industrially-advanced countries. The Minister of State for Science and Technology, Mr C.P.N. Singh, told the Rajya Sabha that initial studies had been undertaken at the Bhabha Atomic Research Centre to develop the technology. "There are no bottlenecks," he added. The possibility of Indo-Soviet cooperation in the field of fusion reactors materials was generally considered at the recent meeting of the Indo-Soviet Sub-Commission on Science and Technology. [Excerpt] [Madras THE HINDU in English 5 Mar 82 p 6]

CSO: 5100/7060

SOUTH KOREA

SEOUL OPTS FOR FRENCH NUCLEAR TECHNOLOGY

Kuala Lumpur BUSINESS TIMES in English 3 Mar 82 p 2

[Text]

SEOUL, March 2

SOUTH Korea has unequivocally adopted French technology for the next phase of its nuclear development programme.

This became clear following the recent decision to award Alsthom-Atlantique the US$486 million-contracts for turbine generators and auxiliary components to be used in its ninth and tenth nuclear power plants.

Thirteen nuclear power plants are planned in the South Korean programme, and bids may soon be sought for a further two plants.

The Alsthom-Atlantique contract complements the award in November 1980, of a nuclear steam supply system contract for the plants to Framatome, the leading French nuclear plant company and a subsidiary of Creusot-Loire.

Alsthom-Atlantique is the heavy engineering arm of Compagnie Generale d'Electricite, the state-owned group.

But the shift to French technology for these particular plants, following previous and heavy reliance on US technology, has raised questions about the South Korean decision.

When Framatome won its contract, nuclear industry executives thought the contract for the conventional equipment had also gone to France. But Korean Electric Power Corporation (Kepco) evidently changed its mind and sought international bids.

Seven companies from six countries were invited to submit bids for the conventional plant, either as a complete package or in parts. Six responded — Alsthom-Atlantique, Brown Boveri of Switzerland, Mitsubishi of Japan, Westinghouse and General Electric of the United States, and GEC of the UK.

Last November, when the bids were evaluated, Alsthom-Atlantique's initial price was the best, said Mr Choi Chang-Tong, general manager of Kepco's Nuclear Planning Department. But it was clearly now low enough to satisfy Kepco.

"Certainly further deductions were made, particularly in reducing the exchange risk, either as a result of French generosity or Korean negotiating skills," Mr Choi added.

Only a minor portion of the Alsthom-Atlantique contract is subject to price escalation. The price for equipment and materials is quoted in Swiss francs and is not subject to escalation.

Finance for the contract is through a French export credit, provided by a consortium led by Societe Generale, Paribas and Banque Francaise du Commerce Exterieur. The interest rate is 7.85 per cent and repayment is over 15 years, starting after seven or eight years depending on the date when the contract is completed. — FT

CSO: 5100/8104

COMMENTATOR ON ATOMIC BOMB ACCUSATIONS

PY311859 Buenos Aires CLARIN in Spanish 17 Mar 82 pp 18-19

[Martin F. Yriart commentary: "Frictions With Washington: The Phantom of the Argentine Atomic Bomb"--passages between slantlines in boldface]

[Text] After a period of relative relaxation following the Reagan administration's coming into office, relations between Washington and Buenos Aires on nuclear matters /are hardening again/. The first signs were detected at the beginning of 1982 with a number of newspaper articles published in the United States and in Great Britain which, citing /top U.S. diplomatic and military intelligence/ sources, stated that Argentina had decided to build an atomic bomb (or that it had already built one) and that /only an intervention at the last moment by a U.S. State Department special mission prevented it from taking place/.

This is not the first time that /the Argentine nuclear bomb issue/ has been raised in an effort to thwart the nuclear development of our country. The gross information errors and the ingenuousness of arguments included in those articles raise doubts as to whether those /"top intelligence sources"/ really exist, because the Argentine nuclear plan /is well known/ among U.S. Government circles--both in the executive branch and its departments, and in congress--and a number of U.S. politicians and government officials made trips to Buenos Aires during the past few years and /visited "sensitive" nuclear installations of our country/.

But this interpretation went down the drain due to remarks made a few days ago by State Department spokesman Dean Fishcher, ratified later in Buenos Aires by Assistant Secretary of State for inter-American Affairs Thomas Enders.

On Monday 8 March, the U.S. newspaper WASHINGTON POST published an editorial entitled: "A Nuclear-Armed Latin America?" In that article, among other groundless remarks, it is said that Argentina is on its way to building nuclear weapons /(the country has committed itself internationally to the exclusive peaceful use of nuclear energy)/; that it is building an unsafeguarded heavy water reactor /(it is building two and one is already operating, all of them under safeguards of the IAEA)/, and that Argentine nuclear exports are unrestrictedly contributing to proliferation /(Argentine nuclear exports, when allowed by international organizations, are placed under the same IAEA safeguards on imports)/.

But the most serious accusation made by the WASHINGTON POST is that "rumors have been circulating for some time of complaints raised at the International Atomic Energy Agency about Argentine activities, including an illegal diversion of fuel from its safeguard reactor."

If true, this statement would involve an extremely serious fact which would demand all kind of punishments and preventive measures against Argentina--including embargoes on equipment and the supply of nuclear technology--and, in fact, the paralysis of the works in Embalse, Atucha II, Arroyito and the plant in Cordoba for conversion of uranium dioxide, all of which are being [word indistinct] out with bidding from international suppliers. Furthermore, the nuclear plant not only will be paralyzed, but the credibility acquired by Argentina in the international nuclear forums and the prestige of its peaceful nuclear development program would decisively be shoved aside.

Vice Adm Carlos Castro Madero, who was attending an international nuclear meeting in Tokyo, denied there /the minimum diversion/ of safeguarded material by Argentina, and added that the IAEA reports confirm the fact. He also explained that Argentina /does not have a program for the development of the peaceful use of nuclear explosives/ because it has not proven to be useful so far. He added, however, that the country is not yet in a position to give up in advance the nuclear explosives because eventually they may become necessary for its development.

Argentina respects, in this field, the guidelines established by the Tlatelolco treaty which declares Latin America a "nuclear weapon free zone" and defends the lawfulness of peaceful nuclear explosions and an international procedure to guarantee the peaceful nature of the explosions.

The U.S. State Department spokesman maintains, however, that /"there is no difference between a nuclear bomb for peaceful use and for military use,"/ thus supporting the denunciations made by the WASHINGTON POST.

The difference of opinions between Argentina and the United States is clear, /but it concerns the means and not the ends of proliferation./ The two countries favor the elimination of nuclear weapons and agree on pointing out the risk they represent for mankind. But while the United States and the signatories of the nonproliferation treaty argue that countries that already have nuclear development of the others--including their peaceful efforts--Argentina maintains that the problem of nonproliferation /can only be solved in the political field and that any interference in the free development of the peaceful purposes of atomic energy is an interference in national sovereignty/ and a covert means to maintain a technological and economic /monopoly/.

Both positions seem to be ever more irreconcilable and, in fact, /exchanges and cooperation between the two countries in this field have ceased completely./

The misunderstanding is certainly regrettable because it not only unnecessarily inhibits relations between the two countries which considerably improved in the recent past, but it also /frustrates the specific objectives of both of them./ With a rigid protectionist policy the United States loses the /participation and real possibility of influencing/ countries with plans of independent nuclear development such as Argentina, Brazil and now Mexico. Argentina must also make /extraordinary and superfluous efforts/ to reinvent already existing but embargoed technologies.

The meaning of the /nonrenunciation/ of the right to peaceful explosions by Argentina cannot be interpreted as being synonymous to the desire to build nuclear explosives. This /"nonrenunciation"/ is part of the position of defending the principle of /legal equality/ among states, which is the basis of the international political system and a consequence of the principle of sovereignty.

The nuclear disagreement between Argentina and the United States can only be interpreted as another /deplorable distortion of international relations,/ a fruit of the threat of the atomic war, and must serve as a warning lesson to accelerate the /final disarmament/ of the nuclear arsenals.

CSO: 5100/2125

FIRST NUCLEAR FUEL PLANT INAUGURATED

PY050200 Buenos Aires HERALD in English 3 Apr 82 p 9

[Article by George Hatch]

[Text] While Argentina's armed forces stormed the potentially oil-rich Malvinas Islands yesterday, its National Atomic Energy Commission (CNEA) quietly inaugurated the first nuclear fuels factory in Latin America.

CNEA President Carlos Castro Madero, addressing approximately 250 people at the ceremony, called the new plant near Ezeiza a step toward nuclear "self-sufficiency," which would free Argentina from "scientific and technological colonialism."

The factory will supply all the fuel for the Atucha I Centre, now in operation, and the Embalse and Atucha II centres when these come into service during the next 8 years.

In an assembly-line process, the factory compresses uranium dioxide powder into pellets which are fitted into zircaloid tubes. The tubes are then mounted in bundles of 36, each bundle comprising one fuel element (see photo).

The uranium dioxide is derived from mined uranium, a separate procedure which Argentina has recently mastered.

The zircaloid tubes are turned out in a plant adjacent in the fuels facility, with the help of metal rolling machines recently purchased from the Soviet Union.

(Zircaloid's low neutron absorption makes it ideal as a sheathing for uranium dioxide pellets because it does not inhibit the neutron collisions which bring about nuclear fission.)

The fuels plant is one component in the CNEA's plan to master all phases of the nuclear fuel cycle.

The next step, to recover plutonium from the nuclear fuel wastes for use as more fuel (or possibly as fodder for nuclear explosives) is now in progress within a kilometer of the fuels factory.

A pilot reprocessing plant, in the early states of construction, will help the CNEA make its first extractions of the politically [as published] volatile plutonium from spent nuclear fuel rods from its atomic electricity centres.

Speaking with reporters after the inauguration ceremonies yesterday, Vice Admiral Castro Madero explained the CNEA's intention to eventually export its technology to other Latin American countries.

He pointed out the CNEA's supervision of an experimental nuclear reactor in Peru and a bid it has presented to Mexico, offering technical training and technological help for that country's nuclear power program.

Turning to a thornier subject, Castro Madero dismissed a question about whether Argentina would accept nuclear wastes from other countries after it builds its planned atomic waste disposal facility.

"This (issue) is too far in the future," Castro Madero said.

Asked if Argentina's military move into the Malvinas would have any effect on the transfer of politically sensitive nuclear technology to Argentina Castro Madero replied, "I'm tremendously pleased with what happened" in the Malvinas.

CSO: 5100/2127

ESFAHAN NUCLEAR TECHNOLOGY CENTER REACTIVATED

Tehran SOBH-E AZADEGAN in Persian 17 Mar 82 p 11

[Interview with Dr Sa'idi, chief of the Nuclear Technology Center in Esfahan]

[Text] Esfahan. IRNA. Effective measures have been taken in Esfahan to carry out plans to transfer in phases technology for atomic power plants to Iran from abroad.

Dr Sa'idi, chief of the Nuclear Technology Center in Esfahan announced this news in an exclusive interview with IRNA in Esfahan. He said: "In view of the dismissal of a French nuclear company which was in charge of establishing the Nuclear Technology Center in Esfahan by agreement with the past regime at a cost of 3 billion rials, and in view of the discovery of a uranium deposit and the finding of a favorable situation for Iran to have this center, the decision was made that we take action to establish this power plant and build a reactor on a long-term basis with the help of Iranian experts".

He said: "We have set phased, long-term goals on this basis, that is: short-term designing and construction of a critical reactor; medium-term designing and construction of a nuclear research reactor; and long-term designing and construction of a nuclear power plant."

In regard to the three-phase plans in point, the chif of the Nuclear Technology Center in Esfahan said: "In carrying out the first phase, the organizations of the Esfahan center have been changed and, in keeping with that goal, we have organized five groups for the following: nuclear research, thermo-hydraulic materials, electronics and control, uranium, and testing materials. Planning has now been made for each of these groups."

Regarding the funds required to establish this center, he said: "The budget and facilities needed have been approved, and recently our research budget of 220 million rials for short-term research was approved."

Concerning the projects that have started, he said: "Preliminary design for the critical nuclear reactor section have been completed, and its comprehensive design also will be starting the first of next year [21 March 1982], and we hope this project will be completed in the next 6 months. Also, another section of it is to produce fuel and fuel rods--part of which work will be performed in Tehran--and the material obtained will be converted into uranium-oxide powder in Esfahan so it can then be convereted into uranium disks in another unit."

While expressing wishes of success for the Iranian experts, he said: "We completed all assembly work on this unit in a week without any foreign help, and we have also decided to produce the first uranium disk within 6 months."

Regarding the designing and construction of a control system for the critical reactor which is yet another section of the project, Dr Sa'idi, chief of the Nuclear Technology Center in Esfahan, stated: "The designing part of this project, which has a lot of advantages, has been concluded, and construction work on it also has started; and work has begun also on three aspects of the thermohydraulic section."

In conclusion, he pointed out the cooperation of his center with the Industrial College of Esfahan in designing a five-megawatt, fossil-fueled power plant.

CSO: 5100/5301

ISRAEL

BRIEFS

NUCLEAR FUSION PROJECT INITIATED--The Energy Ministry has given its approval to a group of private investors from the U.S. who want to set up an experimental nuclear reactor in Israel based on a new type of fusion process. Energy Minister Yitzhak Berman said that no government funds will be spent on the $80 million project, designed to develop a new fusion process and determine if it has a potential for commercial production of electricity. The ministry has recommended to the Israel Lands Administration that it provide a site for the reactor. Berman added that "dozens" of Israeli scientists and technicians will be employed in the project and that this will advance the state of Israel's nuclear technology. Al Schwimmer, former director of Israel Aircraft Industries served as intermediary between the investors and the ministry. Also involved are R.W. Bussard, head of International Energy Systems Company of California and Prof Arye Shani, an Israeli now residing in the U.S. It is understood that the investors are interested in a site along the southern coast near Nahal Sorek. But the head of the ministry's nuclear energy division said that the small-scale experimental reactor does not have to be near a source of large quantities of water, a standard requirement for larger, operational power plants. The process of nuclear fusion which releases energy as nuclei of hydrogen atoms are fused, has never been successfully harnessed to produce electricity. All existing nuclear power plants, including those Israel seeks to build during this decade, are based on fission processes which split the nuclei of uranium atoms. Experiments to develop a suitable fusion process have been conducted for several decades in the U.S. and the Soviet Union. [Text] [Jerusalem THE JERUSALEM POST in English 21 Mar 82 p 1]

YELLOWCAKE FROM PHOSPHATES--Uranium 'yellowcake' production will commence in the near future in a plant being established by Negev Phosphates in the Rotem plain, southeast of Beersheba. The uranium, to be produced from phosphorous acid, a product of phosphate ore, will provide half of the fuel requirements for the nuclear power stations of the type Israel plans to build. The process by which the uranium will be produced is well-known and is used in a number of countries, including the U.S.A. It yields half a kilogram of uranium for every 1,000 kilograms of raw material. An international committee, including representatives of the Atomic Energy Commission, the Ministry of Energy, the Dimona Nuclear Research Facility and Negev Phosphates, is presently discussing the problems, opportunities and political and economic implications of the planned venture. [Text] [Tel Aviv BUSINESS REVIEW & ECONOMIC NEWS FROM ISRAEL in English No 82, 1981/IV p 5]

CSO: 5100/4710

BRIEFS

UNIVERSITY NUCLEAR PROGRAM ESTABLISHED--A graduate studies program at the nuclear engineering department at King 'Abd-al-'Aziz University in Jiddah will start beginning next year. The head of the department, Dr Sami 'Abd-al-Majid, said that the graduate program will have two specialities. The first will be radiation safety engineering and the application of theories of radioactivity. The second speciality will be nuclear reactor and nuclear energy engineering. Dr Samir 'Abd-al-Majid added that the program will accept those with degrees in nuclear engineering as well as those holding B.S. degrees who would have to take other courses which will compensate for whatever they lack in the theoretical areas of engineering. Such courses would be offered at the department. [Jiddah AL-MADINAH in Arabic 13 Feb 82 p 3]

CSO:5100/4712

RESEARCHERS STUDY URANIUM AMOUNT IN LAMINATED PLATES

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[Article by Y. Fanjas: "The Recent Developments in Laminated Fuels for Research Reactors"]

[Text] The author describes the characteristics of laminated fuels and the achievements in this area by the Societe CERCA [Company for the Study and Manufacture of Atomic Fuel], showing that the technology developed satisfies the requirements of low enrichment while maintaining satisfactory performances for the reactors.

Uranium enriched to 93 percent was up to now the selected fuel for research reactors. Now in the last few years (starting from 1978), the policy of nonproliferation of nuclear arms has been manifested by the establishment, under the sponsorship of the IAEA, of an international program strongly supported by a program of the American Department of Energy, the so-called "RERTR Program" (Reduced Enrichment for Research and Test Reactors). The purpose of this program is to permit these reactors to use uranium of reduced enrichment while minimizing losses in performance.

Thus the fuel manufacturers were led to adapting and developing their technologies to maintain in the elements a mass of U235 sufficient to assure the satisfactory operation of the reactors.

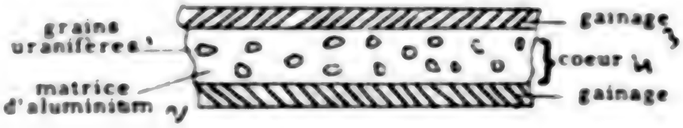
The various international meetings (on this topic) revealed the desire of reactor operators to keep a fuel as similar as possible to the one they now have to limit to the maximum reactor modifications and thus simplify safety problems. Thus the laminated fuel plates now used for most research reactors continue to be of interest and are being developed by the manufacturers concerned, especially CERCA, which has become internationally famous in this area.

Indeed, over more than 20 years, approximately 180,000 plates have left the workshops of the Romans works (in the Drome) headed for French (SILOE, OSIRIS, ORPHEE, RHF,...) and foreign reactors (Belgium, Holland, Sweden, United States, Canada and now Japan, not to mention others). The developments conducted by CERCA since 1978 were based naturally on this vast experience of theirs.

[Let us recall briefly of what a laminated fuel plate consists] /in boldface/: a fissile core, consisting of a uraniferous material scattered in the form of grains in an aluminum matrix, is enclosed tightly in an aluminum alloy can. Fig 1 shows the stages of the manufacturing process. The main phases include the production of the core (or nucleus) by the so-called powder technology (compacting of the mixture of uraniferous and aluminum grains) and co-lamination of this core placed in a frame between two aluminum alloy lids.

Although they may vary considerably from one reactor to the other, the typical dimensions of a plate after lamination are from 600 to 800 mm long, 60 to 80 mm wide and 1.27 to 1.50 mm thick; the core being 0.5 mm thick.

A cross-section perpendicular to the flat surface allows it to be represented as follows:



1. uraniferous grains 2. aluminum matrix 3. casing 4. core

The need for maintaining, and even increasing if possible within an unchanged volume the weight of uranium 235 results in the increase of the total weight of uranium to be introduced by a ratio equal to or higher than that of the enrichments. Thus to reduce the enrichment from 93 to 20 percent, the total amount of U is to be multiplied by 5 in the first approximation.

The above plan shows the two means the manufacturer has to achieve this objective:

--increase the volume of the dispersed material at the cost of the matrix, that is, increase the number of uraniferous grains, therefore the total percentage of aluminum (or titer);

--replace the present uraniferous material (mixed compound of UAl_3-UAl_4, called UAl_x) by materials of higher density, with greater uranium content and inert with respect to the matrix, such as U_3O_8 and U_3Si; Table 1 indicates the densities and the uranium contents of these different materials.

The combination of these two methods allowed the CERCA to achieve, on full size plates and under industrial conditions, the results indicated in Table II.

Although the use of UAlx does not permit a total uranium density in the plate higher than 2.2 g/cm^3, which is very inadequate for convering most elements to a 20 percent enrichment, it is nevertheless interesting in two cases:

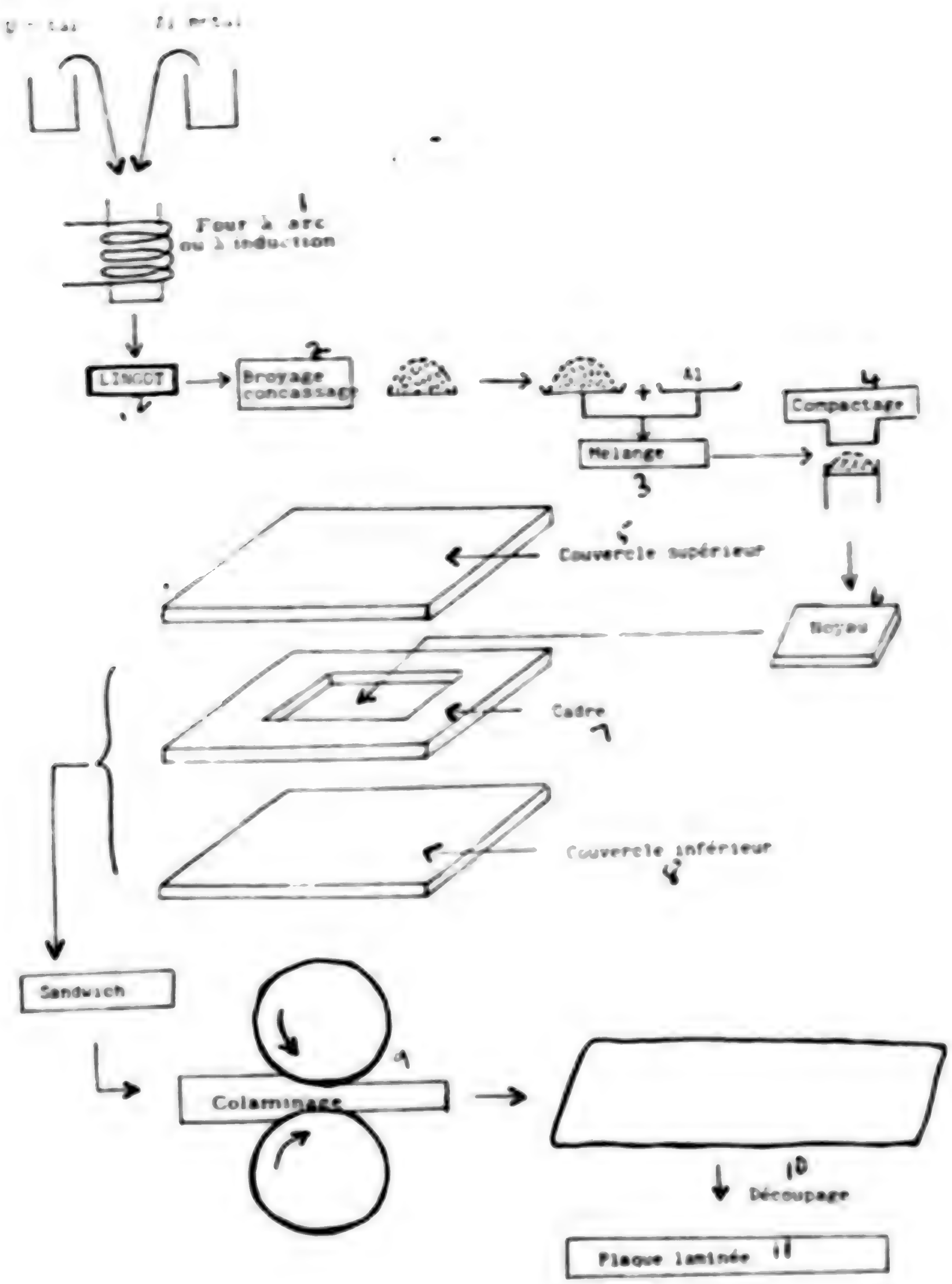


Fig 1. The different operations in the manufacture of a laminated fuel plate
1. arc or induction furnace 2. breaking, crushing 3. mixing 4. compacting 5. upper cover 6. core 7. frame 8. lower cover 9. co-lamination 10. cutting 11. laminated plate 12. bar

--the case where a thickening of the plate core is possible (either at the cost of the casing thickness, or of plate thickness);

--the case where reducing the enrichment to 45 percent seems sufficient.

That is why the CERCA made a considerable effort resulting in eight prototype elements with different charges, geometries and enrichments meant for irradiation in the reactors SILOE in Grenoble, HFR in Petten (Holland) and ORR in Oak Ridge (in Tennessee).

The first of these elements, charged with 2.2 g/cm^3 45 percent enriched uranium, was placed in the SILOE reactor in February 1981 and could be irradiated up to an average 50 percent burn-up without damage; such a result had never been achieved before in the whole world with this type of fuel.

U_3O_8, because of the total uranium density of 3.2 g/cm^3 which it allows, increases greatly the possibilities of conversion to 20 percent and many potential users have shown interest in it. Three irradiation prototype elements, with a charge of 3.2 g/cm^3 20 percent enriched uranium are planned by CERCA by the end of the year (one for SILOE and two for ORR). Other prototypes are planned for other reactors.

Table I: Density and total charge of uranium in different fuel materials

Material	Density (g/cm^3)	Total U densities (g/cm^3)
UAlx (UAl_3 + UAl_4)	6.3	4.5
U_3O_8	8.3	7
U_3Si	15.2	14.6

Table II Total uranium densities achieved in the plates laminated by CERCA

Material	Total U densities (g/cm^3)
UAl or UAlx$^{(1)}$	0.6 to 1.35
UAlx$^{(2)}$	2.2
U_3O_8	3.2
U_3Si	6.5 (sought: 7 to 8)

1. Before development

2. After development

Although the UAlx and U_3O_8 developments have now been perfected and are operational industrially, the latest technological developments concern U_3Si, which has already permitted CERCA to achieve 6.5 g/cm^3 and should finally enable them to achieve 7 to 8 g/cm^3, that satisfies the need for conversion of almost all the reactors. The U_3Si-Al plates with 6.5 g/cm^3 obtained in the industrial workshop in CERCA already fulfill the strictest specifications.

The development studies carried out have already materialized in the form of two large orders: the first concerns the University of Kyoto in Japan to which CERCA delivered a core of 18 elements in March 1981. The divergence took place on 15 May 1981.

This delivery represents a world first (in two respects) since it was the first manufacture at reduced enrichment since the launch of the RERTR program and the first Japnaese order abroad for research reactor fuel.

The second order concerned 20 elements with 20 percent enrichment for the Ford reactor in the United States, which should be delivered in Spetember 1981.

The above statements show that the technology of laminated plates remains perfectly suitable for satisfying the requirements of low enrichments while maintaining performances satisfactory for the reactors. The high charges attainable because of U_3Si will even make it possible to avoid geometrical modifications of the elements, which is very advantageous since the thermo-hydraulic conditions of the reactor will thus remain unchanged.

In conclusion one should remember that if the irradiation programs in progress or those remaining to be implemented for the final qualification of the fuels are completed, the technological solutions and the production processes are ready for satisfying the needs of reducing the enrichment of research reactors using laminated fuel plates.

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